

Textbook Stickers: A Reasonable Response to Evolution?

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Abstract. Debates concerning how the issue of human life's origins should be handled within the confines of American public schools still continue. In order to mitigate the impact that evolution has on students, some school boards and state legislatures have recommended that stickers voicing a disclaimer about evolution be placed in biology textbooks. Even though supporters maintain that textbook stickers promote good science, this kind of approach invariably raises the concern that public education might be unduly intertwined with religion. In this article, it is argued that regardless of whether a textbook sticker can pass constitutional scrutiny, the use of such a sticker is a flawed approach to science education.

1. Introduction

Debates concerning how the issue of human life's origins should be handled within the confines of American public schools are far from over. During the 20th century and into the twenty-first, critics of evolution continue to insist that alternatives to the theory must be taught to give students a fuller appreciation for the diverse collection of views on the subject matter (Campbell and Meyer 2005). In order to mitigate the impact that evolution has on students, some school boards and state legislatures have recommended that stickers offering a disclaimer about evolution be placed in biology textbooks. Even though supporters maintain that textbook stickers promote good science, this kind of approach invariably raises the concern that public education might be unduly intertwined with religion. In this article, the merits of placing a disclaimer about evolution in biology textbooks will be examined. It is argued that regardless of whether a textbook sticker can pass constitutional scrutiny, the use of such a sticker is a flawed approach to science education. It would not help achieve the goal of teaching students good science largely because the stickers use the term 'theory' in a highly ambiguous manner and they imply that evolution is the only portion of biology that requires critical examination.

Public schools have struggled to identify the most appropriate way in which to address the issue of how human life originated. School officials have had to navigate through some difficult waters in the attempt to allay concerns regarding how science teachers confront the issue. More specifically, there is a long, extensive history of complaints that have been lodged against how evolution has been taught. This is due in large part to the vast array of religious beliefs that are held by American citizens. Regarding current policies governing evolution education, critics typically offer two general categories of arguments against teaching evolution in public schools without some form of critique.

First, critics suggest that if evolution is taught ‘unopposed’, it may infringe upon a student’s religious convictions.¹ Since evolution has often been interpreted as advancing a materialist view of the world where species survive by ‘random chance’, critics protest that evolution might covertly or even explicitly support an attack on religion (Johnson 1999). This tends to be an especially pressing issue in the United States where a significant number of citizens interpret the Biblical story of creation in a literal manner. These individuals, typically called ‘young earth’ creationists, believe that an evolutionary explanation of how human life began directly contradicts their view that humans did not descend from other species.² Consequently, teaching evolution is typically seen as being an affront to their religion. As the argument typically goes, the First Amendment is not only supposed to prevent religion from unduly interfering with public policy, it is supposed to stop the government from intruding upon religious freedom. Some scholars argue that evolution education undermines the latter goal by permitting public schools to teach what they believe amounts to an atheistic worldview.

Second, critics argue that many of the current guidelines governing evolution education are problematic because evolution in part³ or as a sum total⁴ is on shaky ground scientifically and students should be made aware of this fact. Intelligent design theorists, for example, criticize the notion that mechanisms such as natural selection and random mutations are sufficient to account for the existence of human beings. According to Michael Behe, a prominent design theorist, biological mechanisms such as blood clotting are ‘irreducibly complex’, roughly meaning that they are too complex to have come into existence through natural means alone (Behe 2004). Critics of evolution maintain that Behe’s argument, and those made by other design theorists, illustrate crucial flaws in evolutionary theory. Consequently, they argue that the public education system would be doing an injustice to students if evolution’s alleged shortcomings are not discussed.

Complaints against biology curriculums containing lessons on evolution have led to several different kinds of legal challenges. Historically, creationists have been the primary individuals responsible for instigating

the challenges to evolution education.⁵ One of their prominent fears is that allowing evolution to be taught might give teachers an opportunity to disparage the religious beliefs of students. During the course of the 20th century, creationists and other like-minded groups tried to remove evolution completely from the classroom through the use of anti-evolution laws. This kind of strategy initially met with some success, but over time anti-evolution laws eventually failed to pass legal muster.⁶ A later strategy tried by critics was that evolution could be taught as long as its impact is mitigated through the use of a balanced-treatment act. More specifically, laws in some states were enacted that permitted evolution to be presented only if creationism is taught alongside it. Since the courts considered balanced-treatment acts to be tied to some kind of religious agenda, they were eventually dismissed on constitutional grounds.⁷ For instance, according to the court in *McLean v. Arkansas*,⁸ the views of creationists were deemed to be non-scientific in nature, because it was determined that creationism failed to uphold the criteria that make a field 'scientific'.⁹ More recently, the textbook sticker approach has emerged to give voice to concerns about evolution while at the same time trying to pass legal scrutiny.

2. The Textbook Sticker Approach

One of the primary places where textbook stickers have had a foothold is in the state of Alabama. In 1996, Alabama embraced the textbook sticker approach (Meikle 2001). The sticker cautions students that their school textbook 'discusses evolution, a controversial theory some scientists present as a scientific explanation for the origin of living things, such as plants, animals and humans' (Alabama Citizens for Science Education 2001). The sticker goes on to suggest that 'No one was present when life first appeared on earth. Therefore, any statement about life's origins should be considered as theory, not fact' (Alabama Citizens for Science Education).

In 2001, the Alabama Board of Education decided to modify the state's textbook sticker. In the revised sticker, the Alabama Board of Education continues to maintain that, 'The theory of evolution by natural selection is a controversial theory that is included in this textbook' (Alabama Department of Education 2001). However, the Board of Education tempers its description of evolution by removing reference to the notion that discussions about 'life's origins' involve 'theory, not fact'. Further, the 2001 sticker retreats from the claim that evolution is merely embraced by 'some scientists'.

Textbook stickers have also been considered in other states including Louisiana (Maggi 2002), Oklahoma (Murphy 2004), Arkansas (McCoy 2005), and Georgia (Ringel 2005). The textbook sticker that was proposed in Cobb County, Georgia states the following ('Judge: Evolution stickers unconstitutional' 2005):

This textbook contains material on evolution. Evolution is a theory, not a fact, regarding the origin of living things. This material should be approached with an open mind, studied carefully and critically considered.

According to its supporters, a textbook sticker, such as the one in Cobb County, is written in secular language and is a sound scientific approach to biology education (Edgington 2004). Yet for those familiar with the legal battles between creationists and supporters of evolution, the seemingly innocuous textbook sticker might have religious overtones. Further, it is important to note that although it might be objectionable in its own right, the Cobb County sticker is less ambitious in its implied criticism of evolution than the stickers that have been used in Alabama. For one, the Cobb County sticker does not refer to evolution as a 'controversial theory'.

Critics of a textbook sticker suggest that it is merely a repackaged form of creationism, another in a series of attempts to bring religion into the classroom. There is a palpable fear that a textbook sticker covertly opens the door for religious views to be endorsed within the confines of a public forum. In fact, since Cobb County's textbook sticker was seen as promoting a religious viewpoint, it was struck down by a district court.¹⁰ Yet one can question whether the aforementioned textbook sticker should be discarded in accordance with relevant legal standards.

Along these lines, David Hacker argues that an evolution textbook sticker can withstand constitutional scrutiny, including the prongs of the *Lemon* test,¹¹ because it promotes a 'secular purpose' (Hacker 2004). Hacker maintains that evolution stickers are used for educational reasons and legal precedents on the issue should not prohibit their use. He argues that textbook stickers are not specifically linked to a sectarian purpose, which may show that they are different in kind from previous initiatives offered by creationists. According to Hacker, a textbook sticker 'should simply enable fair treatment of all scientific origin theories' (Hacker 2004, p.348).

If courts delve into the motives of the groups supporting the stickers, it is likely that religious agendas will be found considering that historical criticisms of evolution almost invariably have some connection to religion. Further, without a doubt, there is much apprehension about the use of textbook stickers because of the danger of a 'slippery slope'. It could be argued, for example, that if a textbook sticker is allowed, it would set the groundwork for convincing school boards to permit a version of intelligent design to be taught in public schools (which is a result that many groups understandably fear). Some critics of evolution hope that a sticker could pave the way for acceptance of textbooks such as *Of Pandas and People*, a work detailing the alleged merits of intelligent design theory (Davis and Kenyon 1993). Yet Hacker's view on the legal dimensions of a textbook sticker has some plausibility because a strict and literal interpretation of

the Cobb County textbook sticker does not seem to endorse explicitly a religious point of view. Although the agenda of the groups supporting textbook stickers supporters can, and often does, coincide with the goals of religious organizations, that alone might not be sufficient to prove that the disclaimer is inherently religious in nature.

Textbook stickers often describe evolution in a less than accurate way, yet it does not necessarily follow from that assessment that the views being articulated are religious. In principle, Cobb County's textbook sticker could be read by a neutral party and not convey a religious connotation. Conceptually, the Cobb County disclaimer could be supported by scholars who are not religious or by individuals who are not seeking to promote religious goals. For example, there are scholars who suggest that they have legitimate scientific reasons for criticizing evolutionary theory (Discovery Institute; Harvey et al. 1996). If they sincerely believe that evolutionary theory has empirical shortcomings, this could lead them to the conclusion that the message conveyed by a sticker has some merit.

Even though it can grudgingly be admitted that if the language of an evolution textbook sticker is strictly interpreted that it might not be religious in nature (and may therefore be able to pass legal scrutiny), there are other significant problems lurking with such stickers. Textbook stickers warning students about evolution contain several significant conceptual and practical flaws. Assuming that public schools should teach students good science, textbook stickers fail to promote that end.

3. The 'Theoretical' Status of Evolution

Among the key flaws contained within a textbook sticker is that it presents evolution in a misleading fashion. For one, there is a non-trivial ambiguity contained within the assertion that stickers generally offer, which is that evolution is a theory pertaining to 'the origin of living things'. The intention of evolution is not to answer the question of how the first living creature on this planet originated. Rather, its focus is to describe how creatures change over time after life emerged. Granted that it does address what tends to be the focal point of disputes between supporters and critics of evolution, which is how *human* life began, but evolution is not supposed to provide an explanation for the first appearance of life.

Further, the Cobb County textbook sticker fails to acknowledge, perhaps deliberately, that the term 'theory' has sharply different meanings. A textbook sticker is not sophisticated and subtle enough to distinguish between the different senses that the term 'theory' carries with it. The term is often used too loosely, sometimes admittedly within scientific circles, to refer to a number of different things. For example, if the term 'theory' is

used within the context of a regular conversation, what speakers often have in mind is ‘an educated guess’. Yet this common use of the term does not share same meaning with how ‘theory’ is formally used in the scientific world. In its technical ‘scientific’ sense, a ‘theory’ refers to a claim that has a large body of supporting evidence behind it. As the National Academies of Science states, the term ‘theory’ within the context of evolution ‘refers to an overarching explanation that has been well substantiated’ (National Academies of Science 1998, Chapter 1).

Since the textbook sticker exclusively and deliberately directs attention to the scientific standing of evolution, the term ‘theory’ is unlikely to be interpreted in a neutral, innocuous fashion. Describing evolution as ‘a theory’ within this context likely conjures up a pejorative connotation, suggesting that evolution is mere speculation without supporting evidence (which is probably the preferred interpretation that supporters of textbook stickers would like students to embrace). Biologists rightly argue that if the term ‘theory’ is understood in this way, it would drastically understate the edifice of evidence supporting evolution. As the National Science Teachers Association states, ‘There is no longer a debate among scientists about whether evolution has taken place’ (NSTA Position Statement 2005).

Before a scientific claim is widely embraced and properly labeled as a ‘theory’ by the scientific community, numerous obstacles and safeguards must be overcome. Henry Bauer explains this facet of science rather well when he distinguishes between ‘frontier science’ and ‘textbook science’ (Bauer 1994, pp.44–48). Attaching the ‘a theory, not a fact’ label to evolution does not speak to the spectrum spanning from newly proposed claims where a foundation of evidence still needs to be established, ‘frontier science’, to well-established theories that have already gained broad acceptance, ‘textbook science’. Since biologists have been working to hone and refine evolutionary theory for well over a century, there are justifiable reasons to place the main tenets of evolution in the latter category.

An evolution disclaimer is not precise enough to impart the notion that scientific claims can have sharply different levels of evidence supporting them. It is profoundly misleading to imply that every claim that has been called a ‘theory’ is on par with each other. Presenting students with the hopelessly ambiguous statement that evolution is ‘a theory’ does not convey the importance that evolution has to biology and to other related fields. For example, Masaru Emoto offers a ‘theory’ that the molecular structure of water is responsive to the emotions that human beings experience (Emoto 2004). According to Emoto, our emotions can alter the crystalline structure of water. Emoto’s view is ‘theory, not fact’ in some sense but it certainly does not have the same standing in the scientific community that evolution has. This is not to say that evolution is perfect or that its fundamental tenets

will never be abandoned (although I am skeptical that they will be). Yet the use of the term ‘theory’ within the context of a textbook sticker is too open to interpretation and would potentially leave students with the impression that evolution is a product of guesswork and conjecture.¹²

Further, the implication stemming from a textbook sticker that evolution is ‘a theory’ is deceptive in the sense that the term ‘evolution’ does not refer to just one singular claim. To put it simply, what is typically referred to as ‘evolution’ in common discourse is a vast collection of interconnected claims and these claims are not all equally supported by the same level of evidence. According to the National Academies of Science (National Academies of Science 1998, Chapter 3):

...evolution remains an extremely active field of research, with an abundance of new discoveries that are continually increasing our understanding of exactly how the evolution of living organisms actually occurred.

Within the domain of evolution, there is a subset of the claims that are accepted as fact. Some claims pertaining to evolution have reached the stage of being accepted as scientific theories. Others are promising hypotheses but require additional investigation. For example, the notion that there are changes in allele frequency over time within a species, an essential part of evolutionary theory, is an established fact. Yet the significance of cooperative behavior within the evolutionary process is a contentious issue upon which biologists disagree.¹³

In sum, to insinuate that evolution is a mere theory, potentially on par with novel, unsupported views in the scientific world, does a great disservice to the research performed to substantiate evolution’s claims and frankly borders on being an irresponsible pedagogical approach. Although Hacker claims that textbook stickers ‘make good public policy because they equip students with a better understanding of scientific origin theory’ (Hacker 2004, p.346), such stickers would likely fail in the effort to promote critical thinking and would not provide an appropriate understanding of how science works. As Kenneth Miller points out, textbook stickers like the ones embraced in Alabama and Oklahoma ‘introduce the dangerous precedent of setting official statements by public officials at odds with scientific accuracy and good educational practice’ (Miller 2001). By potentially leading students to the misguided conclusion that evolution is speculation, a sticker would belittle the importance that evolution has to the field of biology and to science more generally.

4. Promoting Science Education

It is a noble goal that supporters of textbook stickers ostensibly endorse, which is the promotion of critical thinking in the science classroom. Yet it

is not clear how critical thinking skills are honed if a biological theory is being presented in a manner that biologists would reject. Further, teaching students to think critically does not mean imparting to them that they should have a completely 'open mind', which causes them to treat each scientific claim as though it is of equal value. As Robert Pennock rightly notes, 'Critical thinking does not mean indiscriminate thinking, but thinking governed by the rules of reason and evidence' (Pennock 2002). Students should not be left with the impression that each scientific claim has the same level of evidential support behind it. Rather, students should learn that critical thinking, at least in part, entails gaining the intellectual tools to discern why some theories are more likely to be true than others are.

A textbook sticker, like the one proposed in Cobb County, is also flawed in the sense that by explicitly setting apart evolution at the beginning of a school textbook, it in effect implies that evolution is the only portion of biology that is subject to question and that biologists agree about most everything else in the field. However, students should not be left with this mistaken impression. Evolution *is not* the only part of biology being actively revised. Further, it *is not* the only part of biology that necessitates the use of a student's critical thinking ability. Of course, all of biology should be 'studied carefully and critically considered' not just evolution.

To uncover controversies within the field of biology, one need only point to the field of nutrition.¹⁴ One can find, almost on a daily basis, current and heated disputes about how evidence pertaining to human health should best be interpreted. Further, there are countless scholarly debates within the realm of genetics, many of them relating to the possible interconnections between DNA and human behavior. For example, Michael Gazzaniga offers a view that our moral beliefs and behaviors are determined to a large degree by our genes (Gazzaniga 2005). Yet there is far from a consensus on the issue of whether morality has a significant genetic component. On a related note, scientific debates are certainly not limited to the field of biology. In the realm of astronomy, for example, there are divided scholarly opinions about what the criteria are for labeling something as being a 'planet' (Chang and Overbye 2005).

In essence, a textbook sticker directs too much attention to evolution. It runs the risk of presenting science in a much too oversimplified fashion. It can leave students with the impression that scientists have resolved all of their disputes except the ones pertaining to evolution and life's origins. As mentioned previously, scientific claims within and outside the domain of evolution are often questioned and refined. Scientists continue to participate in ongoing battles concerning which claims are more likely to be true.

Throughout the history of science, even cherished and widely-supported theories have been abandoned. If students are being taught science adequately, they should learn that scientific claims, even ones not directly related to evolutionary theory, are subject to revision.¹⁵ At the same time, however, they also need to appreciate that when a claim has reached the status of formally being labeled as a 'scientific theory' or 'law', especially within the context of a science textbook, it entails that the relevant claim has a solid base of supporting evidence behind it, which sharply distinguishes it from mere opinion or an educated guess.

On the practical side, it is doubtful that the textbook sticker approach would alleviate the perceived problems associated with evolution education. Hacker and other supporters of textbook stickers, often operating under the guise of academic freedom, assert that stickers 'ease the transition pains for most educators' (Hacker 2004, p.348). Yet the likely outgrowth of the textbook sticker approach is that students would be presented with a caricature of evolution. Considering that it is already common that public school teachers avoid evolution or give it cursory treatment because of political pressure and protests from parents, textbook stickers may exacerbate existing problems with science education in public schools (Lerner 2000). It seems reasonable to suggest that if politicians and parents are successful in their attempt to modify the tenets of evolution education in different states, it may just further 'encourage' teachers to bypass evolution altogether so that they do not generate controversy.

Even though Hacker suggests that using a textbook sticker might alleviate some of the 'current hostility',¹⁶ that biologists have toward discussing alternatives to evolution, it is unlikely that this 'hostility' will die down if a sticker is placed within textbooks. For example, the American Association of University Professors states that it 'deplores efforts in local communities and by some state legislators to require teachers in public schools to treat evolution as merely a hypothesis or speculation' (AAUP 2005). Further, when the school board in Dover, Pennsylvania, decided to make intelligent design a mandatory part of the curriculum, biology teachers were supposed to read a statement describing intelligent design and the alleged 'gaps' in evolution. Yet teachers in Dover refused to read the statement to their students ('2 School Boards' 2005).

Textbook stickers may intensify the frustration that biology teachers have with critics of evolution, especially considering how frequently politicians and other non-scientists continue to interfere with a field, biology, which is likely outside their own realm of expertise. Support for textbook stickers generally comes from people outside the scientific community, such as politicians and parents, not from biologists themselves. Since much of the momentum behind textbook stickers comes from non-scientists, it is

doubtful that a textbook sticker initiative would be well received by biology teachers.

5. Conclusion

Even though an evolution textbook sticker may arguably hold up better under legal scrutiny than other attempts to challenge evolution education in public schools, a sticker will not enhance the effectiveness of teaching students about science. Textbook stickers, such as the one proposed in Cobb County, Georgia, contain conceptual and practical flaws, which render them inherently problematic. Thus, they should not be placed in public school textbooks. Further, taking into account the standing evolution has within the scientific community because of the level of supporting evidence behind it and that critiques of evolution primarily come from non-scientific (usually religious) sources, it is unlikely that textbook stickers would be a beneficial and welcomed addition to the biology classroom.

Notes

¹ This type of complaint voiced against evolution is not a new one. It has reached the courts on several occasions. For example, *Moeller v. Schrenko, et al.*, 251 Ga. App. 151 (2001).

² For example, the Creation Research Society, a prominent creationist research organization, accepts a literal interpretation of the story of creation. The group has articulated a *Statement of Belief*, which reflects this fact. It can be found at http://www.creationresearch.org/stmnt_of_belief.htm (last visited April 24, 2006).

³ Contemporary supporters of intelligent design, for example, typically attack some of the conceptual underpinnings of evolutionary theory, but they usually admit that evolution in some form did occur.

⁴ Members of the Creation Research Society and other 'young earth' creationists have offered arguments along these lines. They reject most, if not all, of the fundamental tenets of evolutionary theory.

⁵ Of course, the term 'creationist' is a notoriously ambiguous one. The term has taken on several different meanings within the context of the debates about evolutionary theory. In this article, 'creationist' largely refers to an individual who accepts a literal interpretation of the Bible.

⁶ The legal standing of anti-evolution statutes was addressed by the Supreme Court in the case of *Epperson v. Arkansas*, 393 US 97 (1968).

⁷ The legal standing of balanced-treatment acts, or more specifically Louisiana's 'Creationism Act', was addressed by the Supreme Court in the case of *Edwards v. Aguillard*, 482 US 578 (1987).

⁸ 529 F. Supp. 1255 (1982); the Court held in the case that it is unconstitutional to require that creationism be taught in public schools.

⁹ Michael Ruse's criteria for science, including testability, integrity, and tentativeness, were a crucial part of the decision made in *McLean* case (Ruse 1982).

¹⁰ At the time this article was written, an appeal of the court's decision had not yet taken place.

¹¹ Over the last three decades, a number of courts have applied the *Lemon* test, which is a set of three criteria used to determine whether a policy would create an 'excessive entanglement' between government and religion; see *Lemon v. Kurtzman*, 403 US 602 (1971).

¹² According to the National Association of Biology Teachers, 'Scientists have firmly established evolution as an important natural process' (National Association of Biology Teachers 2004).

¹³ Biologists and other scholars are actively trying to explain the possible relationship between evolution and different forms of cooperative behavior (for a recent article examining this type of issue see Burtsev and Turchin 2006).

¹⁴ For example, there have been numerous debates concerning the amount of carbohydrates people should consume in their diet (Cohen 2001).

¹⁵ Robert Pennock, drawing from the philosophy of John Dewey, articulates the point rather well that science teachers need to impart to students how to think critically instead of merely requiring of them that they memorize facts, which in part involves providing them with the tools to understand why some claims are better supported by evidence than others are (Pennock 2002, 2003).

¹⁶ This term is taken from Hacker's article (Hacker 2004, p.348).

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